2.3.3 CLEARANCES

A. Bridges
For structures with spans 20’ or more, the minimum clearance above Q_{50} high water shall be 2’-0”. In addition, the 100-year flood (Q_{100}) must also pass beneath the bridge.

B. Culverts
For box culverts, pipes, and pipe arches with a clear span of 12’ or more and all stiff-leg culverts and open bottom pipes, the minimum clearance above Q_{50} high water shall be 1’-0”. When debris is carried by the waterway during high water flow, a minimum clearance of 2’ should be considered. In addition, the 100-year flood (Q_{100}) must also pass beneath the bridge.

For pipes, pipe arches, and box culverts with a clear span less than 12’, the ratio of the headwater to diameter during Q_{25} flow should be equal to or less than 1.25 (HW/D≤1.25). When debris is carried by the waterway during high water flow, a minimum clearance of 2’ should be considered.

2.3.3.2 HIGHWAY VERTICAL

All new bridges are to be designed for 17'-0" of vertical clearance. This clearance may be reduced with prior approval from the Roadway Design Engineer, Maintenance Engineer, and Bridge Engineer, but is not to be less than 16'-0".

During construction, as much vertical clearance as possible is desirable, with 14'-9" being the minimum desirable. The minimum legal vertical clearance is 14'-0". Check with the Permits Unit in Headquarters for restrictions for each particular site.

2.3.3.3 HIGHWAY HORIZONTAL

The structure width is generally controlled by the geometry of the approaching roadway. The required roadway widths are established in the *Roadway Design Manual*, Appendix C.

A. Bridges
The curb-curb width of new bridges shall be as follows:

No Sidewalk

Concrete Parapet:	roadway width + 3'-4"
Curb Mount Metal Rail:	roadway width + 4'-7½"

Sidewalk

Raised Sidewalk:	roadway width
At-grade Sidewalk:	roadway width + 3'-4"

B. Culverts
The curb-curb width of new culverts shall be as follows:

Clear Zone Provided

No Guardrail:	roadway width + clear zone

Clear Zone Not Provided

W-Beam/Thrie Beam:	roadway width + 10'-0"
Concrete Porta-rail:	roadway width + 14'-0"
Concrete Parapet:	roadway width + 3'-4"

C. Construction
Horizontal clearances should be verified with the District Design Engineer, District Traffic Engineer, and the Bridge Engineer.

2.3.3.4 RAILROAD OVERPASS

For bridges carrying the railroad over the highway, the vertical clearances for highway crossings shall apply.
For bridges carrying highways over the railroad, the minimum vertical clearance shall be 23’-0” from the top of rail at a point directly over the centerline of track.

For exceptions, e.g. widening of existing structures, the railroad and PUC approvals should be obtained prior to final layout.

The UPRR and BNRR/SANTA FE standard drawings have not been approved by FHWA and are considered guidelines only. The dimensions shown as minimums on the standards should be considered as maximums for the purpose of determining span lengths. Exceptions to the standards that will reduce the bridge cost should be considered in the preliminary design stage of the project. Any exceptions to the standards must be approved by the railroad Chief Engineer and approval should be obtained prior to the final layout.

Some of the items where exceptions should be considered on a project-by-project basis are:

- Ditch width
- Location of the railroad pole line to eliminate or reduce the distance between the pier and the ditch slope.
- Elimination of splash boards
- Use of 1½:1 slopes on slope paving